Thank you for purchasing this Esco Forced Convection Laboratory Ovens and Incubators. Please read this manual thoroughly to familiarize yourself with the many unique features and exciting innovations we have built into your new equipment. Esco provides many other resources at our website, www.escoglobal.com, to complement this manual and help you enjoy many years of productive and safe use of your Esco products.

User Manual

For Technical Service, contact
North America
Esco Technologies, Inc.
2940 Turnpike Drive, Units 15-16 • Hatboro, PA 19040, USA
Toll-Free USA and Canada 1-877-479-3726
Tel 215-441-9661 • Fax 215-441-9660
us.escoglobal.com • usa@escoglobal.com

Rest of World
Esco Micro Pte. Ltd.
21 Changi South Street 1 • Singapore 486 777
Tel +65 6542 0833 • Fax +65 6542 6920
www.escoglobal.com • mail@escoglobal.com

Isotherm

Forced Convection
Laboratory Ovens and Incubators

Esco OFA/IFA User Manual
Version A - Released July 2011

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Table of Contents

i Table of Contents
iii Warranty Terms and Conditions
v Introduction
v 1. Products Covered
v 2. Safety Warning
v 3. Limitation of Liability
v 4. European Union Directives on WEEE and RoHS
vii Declaration of Conformity

1 Chapter 1 – Product Information
1 1.1 About Forced Convection Laboratory Ovens and Incubators
1 1.2 Labels
2 1.3 Quick View
2 1.3.1 Front Quick View
3 1.3.2 Back Quick View
3 1.4 Applications

5 Chapter 2 – Installation
5 2.1 General Requirement
5 2.1.1 Location Requirements
5 2.1.2 Environmental Requirements
6 2.1.3 Power Requirements
6 2.2 Installation
6 2.2.1 Shelf Installation
6 2.2.2 Unit Installation
6 2.3 Disclaimer

7 Chapter 3 – Control System and Operation
7 3.1 Control System
7 3.1.1 Function Keys
7 3.1.2 LED Indicators
7 3.1.3 Independent Adjustable Over-Temperature Thermostat
8 3.1.4 Airflow Adjuster
8 3.2 Placement of Loads
9 3.3 Unit Operation
9 3.3.1 Switching ON/OFF
9 3.3.2 Opening/Closing the Outer Door
8 3.3.3 Setting Temperature
9 3.4 Menu & Options
9 3.4.1 Alarm Setting
9 3.4.2 Fan Speed Setting
10 3.4.3 Timer Setting
11 3.4.4 Unit Setting
11 3.4.5 Password (PIN) Setting
11 3.4.6 Address Setting
11 3.5 Program
11 3.5.1 Setting Program
12 3.5.2 Program Operation
12 3.5.3 Setting Temperature and Time in Program Mode
14 3.6 Calibration

15 Chapter 4 – General Maintenance
15 4.1 Scheduled Maintenance
15 4.2 Cleaning

15 4.2.1 The Glass Door
16 4.2.2 Control Panel, Exterior & Interior Surfaces, Screen Frame, Temperature Probe
16 4.2.3 Decontaminate Work Zone
16 4.3 Physical Inspection
16 4.3.1 Re-Adjustment of Outer Door
17 4.4 Removal of Deposits
17 4.5 Maintenance/Service Logs

19 Chapter 5 – Troubleshooting

Appendix

Warranty Terms and Conditions

Esco products come with either a 1, 2 or 3 year limited warranty, depending on the product purchased, beginning on the date of shipment from any Esco international warehousing location. To determine which warranty applies to your product, refer to the appendix below.

Esco's limited warranty covers defects in materials and workmanship. Esco's liability under this limited warranty shall be, at our option, to repair or replace any defective parts of the equipment, provided if proven to the satisfaction of Esco that these parts were defective at the time of being sold, and that all defective parts shall be returned, properly identified with a Return Authorization.

This limited warranty covers parts only, and not transportation/insurance charges.

This limited warranty does not cover:

- Freight or installation (inside delivery handling) damage. If your product was damaged in transit, you must file a claim directly with the freight carrier.
- Products with missing or defaced serial numbers.
- Products for which Esco has not received payment.
- Problems that result from:
    - External causes such as accident, abuse, misuse, problems with electrical power, improper operating environmental conditions.
    - Servicing not authorized by Esco.
    - Usage that is not in accordance with product instructions.
    - Failure to follow the product instructions.
    - Failure to perform preventive maintenance.
    - Problems caused by using accessories, parts, or components not supplied by Esco.
    - Damage by fire, floods, or acts of God.
    - Customer modifications to the product
- Consumables such as filters (HEPA, ULPA, carbon, pre-filters) and fluorescent / UV bulbs.
- Esco is not liable for any damage incurred on the objects used on or stored in Esco equipment. If the objects are highly valuable, user is advised to have in place independent external preventive measures such as connection to a centralized alarm system.

Factory installed, customer specified equipment or accessories are warranted only to the extent guaranteed by the original manufacturer. The customer agrees that in relation to these products purchased through Esco, our limited warranty shall not apply and the original manufacturer's warranty shall be the sole warranty in respect of these products. The customer shall utilize that warranty for the support of such products and in any event not look to Esco for such warranty support.

Esco encourages all users to register their equipment online at www.escoglobal.com/warranty or complete the warranty registration form included with each product.

ALL EXPRESS AND IMPLIED WARRANTIES FOR THE PRODUCT, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN TIME TO THE TERM OF THIS LIMITED WARRANTY. NO WARRANTIES, WHETHER EXPRESS OR IMPLIED, WILL APPLY AFTER THE LIMITED WARRANTY PERIOD HAS EXPIRED. ESCO DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES PROVIDED FOR IN THIS LIMITED WARRANTY OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, ANY LIABILITY FOR THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES, FOR PRODUCTS NOT BEING AVAILABLE FOR USE, OR FOR LOST WORK. ESCO'S LIABILITY WILL BE NO MORE THAN THE AMOUNT YOU PAID FOR THE PRODUCT THAT IS THE SUBJECT OF A CLAIM. THIS IS THE MAXIMUM AMOUNT FOR WHICH ESCO IS RESPONSIBLE.

These Terms and Conditions shall be governed by and construed in accordance with the laws of Singapore and shall be subject to the exclusive jurisdiction of the courts of Singapore.

Technical Support, Warranty Service Contacts
USA: 1-877-479-3726
Singapore: +65 65420833
Global Email Helpdesk: support@escoglobal.com
Visit http://www.escoglobal.com/ to talk to a Live Support Representative
Distributors are encouraged to visit the Distributor Intranet for self-help materials.

Product Appendix, Warranty Listings

Biological Safety Cabinets, Laminar Flow Cabinets, HEPA-Filtered Cabinets (except Streamline brand)	The warranty periods for BSC may vary by country. Contact your local distributor for specific warranty details.
Laboratory Fume Hoods	2 years limited.
Ductless Fume Hoods	4 years limited for Ascent Opti, 6 years for Ascent Max.
Cleanroom Equipment	1 year limited.
Laboratory Ovens and Incubators	1 year limited.
CO_2 Incubators	2 years limited.
Containment/Pharma Products	2 years limited.
Ultralow Temperature Freezer	3 years limited. 60 months on Compressor.

The warranty period starts two months from the date your equipment is shipped from Esco facility for international distributors. This allows shipping time so the warranty will go into effect at approximately the same time the equipment is delivered to the user. The warranty protection extends to any subsequent owner during the warranty period. Distributors who stock Esco equipment are allowed an additional four months for delivery and installation, providing the product is registered with Esco. User can register product online at www.escoglobal.com/warranty or complete the warranty registration form included with each product.

Policy updated on 1st December 2011 (This limited warranty policy applies to products purchased on or after 1st January 2012)

Introduction

1. Products Covered

Esco Isotherm – Forced Convection Laboratory Ovens					
Electrical	**32L**	**54L**	**110L**	**170L**	**240L**
220-240 VAC 50/60 Hz 1 Φ	**OFA-32-8**	**OFA-54-8**	**OFA-110-8**	**OFA-170-8**	**OFA-240-8**

Esco Isotherm – Forced Convection Laboratory Incubators					
Electrical	**32L**	**54L**	**110L**	**170L**	**240L**
220-240 VAC 50/60 Hz 1 Φ	**IFA-32-8**	**IFA-54-8**	**IFA-110-8**	**IFA-170-8**	**IFA-240-8**

2. Safety Warning

- Anyone working with, on or around this equipment should read this manual. Failure to read, understand and follow the instructions given in this documentation may result in damage to the unit, injury to operating personnel, and / or poor equipment performance.
- Any internal adjustment, modification or maintenance to this equipment must be undertaken by qualified service personnel.
- The use of any hazardous materials in this equipment must be monitored by an industrial hygienist, safety officer or some other suitably qualified individual.
- Before you process, you should thoroughly understand the installation procedures and take note of the environmental / electrical requirements.
- In this manual, important safety related points will be marked with the symbol.
- If the equipment is used in a manner not specified by this manual, the protection provided by this equipment may be impaired.

3. Limitation of Liability

The disposal and / or emission of substances used in connection with this equipment may be governed by various local regulations. Familiarization and compliance with any such regulations are the sole responsibility of the users. Esco's liability is limited with respect to user compliance with such regulations.

4. European Union Directive on WEEE and RoHS

The European Union has issued two directives:

• **Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE)**

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:

Esco sells products through distributors throughout Europe. Contact your local Esco distributor for recycling/disposal.

• **Directive 2002/95/EC on Restriction on the use of Hazardous Substances (RoHS)**

With respect to the directive on RoHS, please note that this hood falls under category 8 (medical devices) and category 9 (monitoring and control instruments) and is therefore exempted from requirement to comply with the provisions of this directive.

Declaration of Conformation

In accordance to EN ISO/IEC 17050-1:2010

We, Esco Micro Pte. Ltd.
of 21 Changi South Street 1
Singapore, 486777
Tel: +65 6542 0833
Fax: +65 6542 6920

declare on our sole responsibility that the product:

Category : Forced Convection Laboratory Ovens
Brand : Isotherm
Model : OFA-32-8, OFA-54-8, OFA-110-8, OFA-170-8, OFA-240-8

in accordance with the following directives:

2006/95/EEC : The Low Voltage Directive and its amending directives
92/31/EEC : The Electromagnetic Compatibility Directive and its amending directives

has been designed to comply with the requirement of the following Harmonized Standard:

Low Voltage : EN 61010-1:2010
EMC : EN 61326-1:2006 Class B

More information may be obtained from Esco's authorized distributors located within the European Union. A list of these parties and their contact information is available on request from Esco.

XQ Lin
Group CEO, Esco

This Declaration of Conformity is only applicable for 230V AC 50/60Hz units

Declaration of Conformation

In accordance to EN ISO/IEC 17050-1:2010

We, Esco Micro Pte. Ltd.
of 21 Changi South Street 1
Singapore, 486777
Tel: +65 6542 0833
Fax: +65 6542 6920

declare on our sole responsibility that the product:

Category : Forced Convection Laboratory Incubators
Brand : Isotherm
Model : IFA-32-8, IFA-54-8, IFA-110-8, IFA-170-8, IFA-240-8

in accordance with the following directives:

2006/95/EEC : The Low Voltage Directive and its amending directives
92/31/EEC : The Electromagnetic Compatibility Directive and its amending directives

has been designed to comply with the requirement of the following Harmonized Standard:

Low Voltage : EN 61010-1:2010
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XQ Lin
Group CEO, Esco

This Declaration of Conformity is only applicable for 230V AC 50/60Hz units

Chapter 1 - Product Information

1.1 About Forced Convection Laboratory Ovens and Incubators

Forced Convection
Convection is a method to transfer of heat energy that involves the movement of a fluid (gas or liquid). Fluid in contact with the source of heat expands and tends to rise within the bulk of the fluid. Cooler fluid sinks to take its place, setting up convection current. However, in a forced convection device, the fluid motion is generated by an external source (like a pump, fan, suction device, etc.).

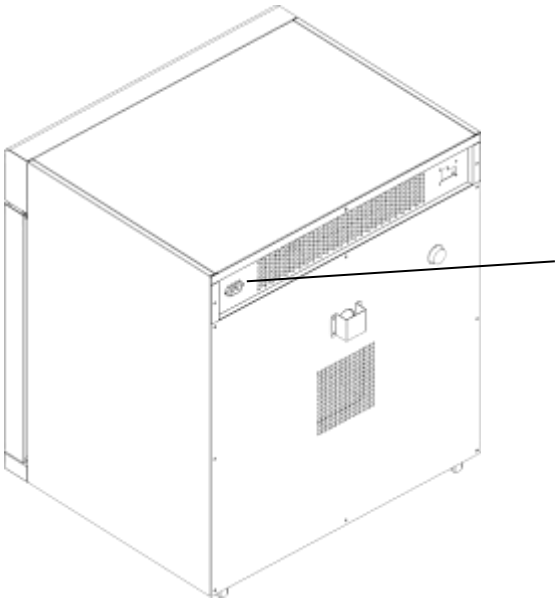
Forced Convection Laboratory Oven
Laboratory ovens are ovens for high-forced volume thermal convection applications. These ovens generally provide uniform temperatures throughout. Process applications for laboratory ovens can be for annealing, die-bond curing, drying, Polyimide baking, sterilizing, and other industrial laboratory functions. Typical sizes are from one cubic foot (28 liters) to 32 cubic feet (906 liters) with temperatures that can reach 572°F (300°C).

Given special requirements in MDD (Medical Device Directions), decontamination of the medical devices specified in 93/42/EWG Direction by the Forced Convection Laboratory Oven is not permitted.

Forced Convection Laboratory Incubator
Laboratory incubator is a device for controlling the temperature, humidity, and other conditions in which a microbiological culture is being grown. Typical incubators are insulated boxes with an adjustable heater, going up to 60°C to 65°C (140°F to 150°F), though some can go slightly higher (generally to no more than 100°C).

Incubators can vary in size from tabletop to units the size of small rooms. As for temperature, most commonly used is approximately 36°C to 37°C. Most bacteria, especially the frequently used E. Coli, grow well under such conditions. For other experimental organisms, such as the budding yeast Saccharomyces cerevisiae, a growth temperature of 30°C is optimal.

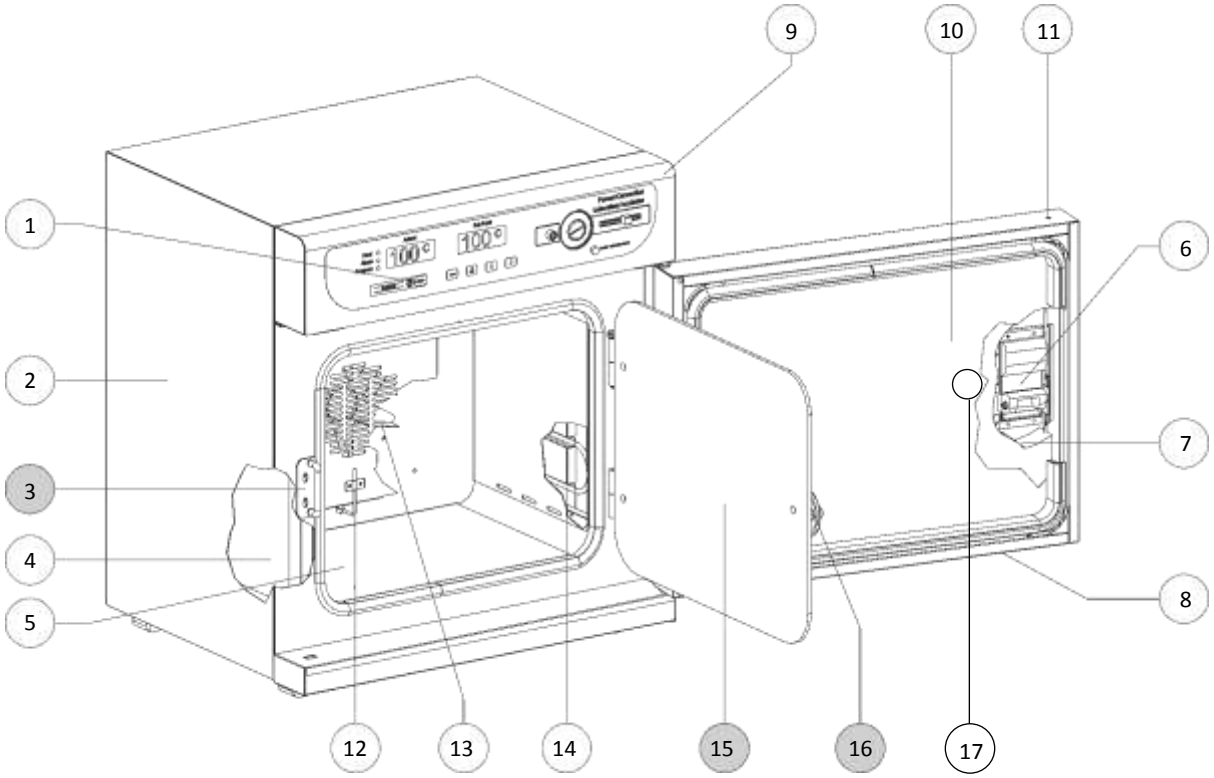
1.2 Labels



Model : The model of the unit
Serial : The serial number of the unit.
Power : The maximum power consumption and the electrical requirement of the unit.
Manufacture in : The time of manufacture.

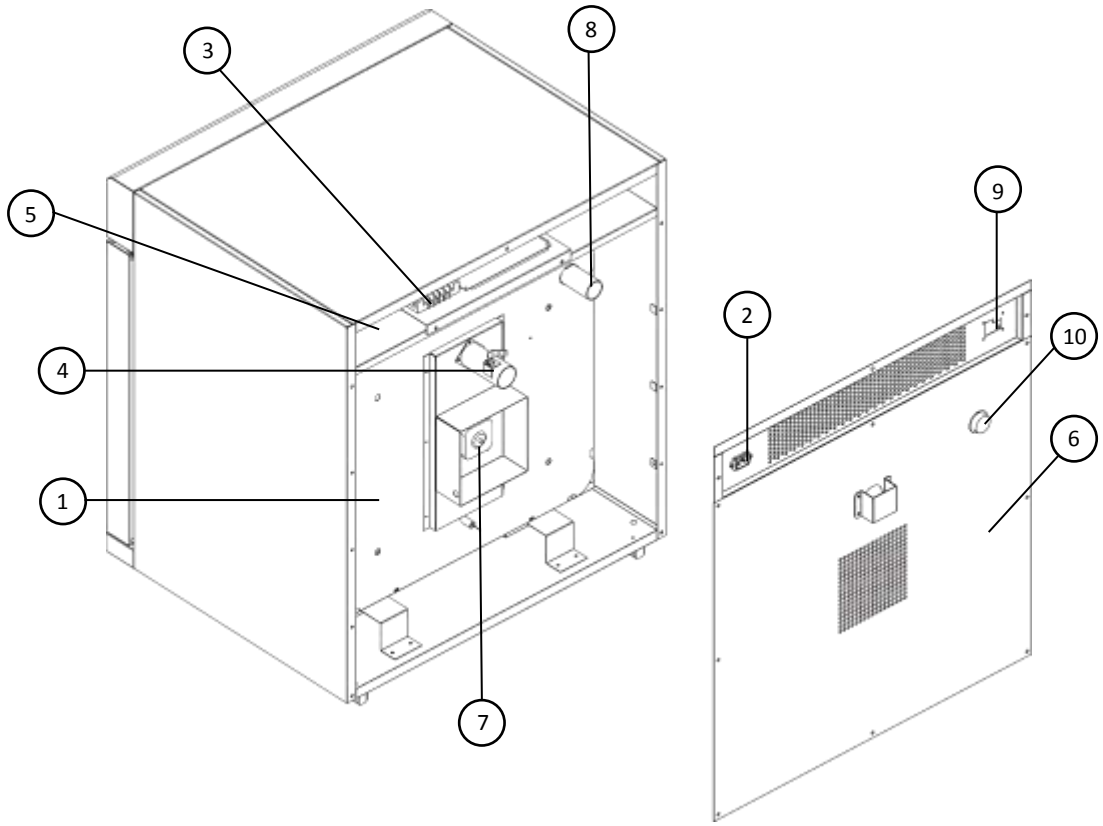
1.3 Quick View

1.3.1 Front Quick View



1. Control panel
2. Outer chamber
3. Catch (for IFA only)
4. Heat insulation of inner chamber
5. Inner chamber
6. Door Handle
7. Heat insulation of outer door
8. Outer door
9. Control box
10. Door panel
11. Door rod
12. Temperature probe
13. Circulation fan
14. Heating element
15. Glass door (for IFA only)
16. Glass door handle (for IFA only)
17. Keylock

1.3.2 Back Quick View



1. Inner chamber
2. Electrical inlet
3. Electrical board
4. Exhaust vent pipe
5. Middle plate
6. Back cover
7. Circulation fan motor
8. Access port
9. RS232 provision (optional)
10. Access port cover

1.4 Applications

Forced Convection Laboratory Oven (OFA)

Dries and heats solid / liquid materials.

Note: *Given special requirements in MDD (Medical Device Directions), decontamination of the medical devices specified in 93/42/ EWG Direction by the Forced Convection Laboratory Oven is not permitted.*

Forced Convection Laboratory Incubator (IFA)

Enables accurate constant temperature for harmless substances within the set scope of temperature.

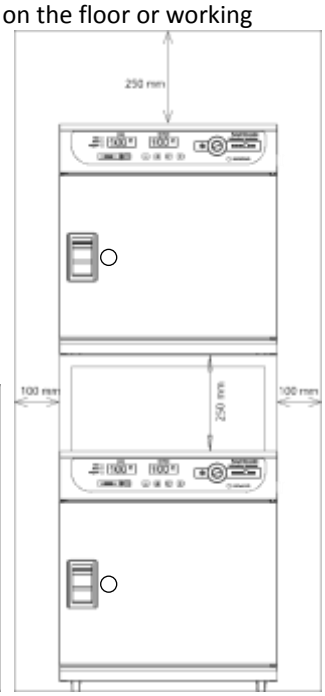
Note: *Given high-accurate temperature measurement and high-precision control, it is especially suitable for incubation applications at 37˚C.*

Chapter 2 – Installation

2.1 General Requirement

2.1.1 Location Requirements

- Isotherm® Forced Convection Laboratory Oven / Incubator can be placed on the floor or working surface or sub frame. It is important that the equipment is set up accurately horizontally (properly leveled) as the door may have to be adjusted. (See Chapter 4 "Maintenance and Cleaning").
- Do not keep equipment close to flammable materials!
- When moving the equipment, do not lift using the door or the door handle.
- The spacing from the back of the equipment should be at least 200 mm (7.9"). The spacing to the ceiling must not be less than 250 mm (9.8") and that at the side to the wall not less than 100 mm (3.9"). It is essential to ensure adequate air ventilation around the equipment.



- 2 units of the same model size can be stacked on each other. The spacing between each other should be at least 250 mm (9.8").
  Note: *If equipment is to be stacked on top of each other, the equipment with the lower working temperature must always be placed at the bottom.*

- Allow at least 30 mm (1.2") opening from the bottom of the equipment for air circulation.

2.1.2 Environmental Requirements

- Indoor use
- Altitudes of up to 2000 meters (6600')
- Relative humidity 70% non-condensing
- Ambient temperature 5°C - 40°C (41°F - 104°F); 15°C - 30°C (59°F - 86°F) for the best performance

- *Technical specification for the equipment is specified for units with standard equipment at an ambient temperature +25°C and a voltage fluctuation of ±10 %.*
- *The temperature data are determined in accordance to factory standard following DIN* 12 880.

2.1.3 Power Requirements

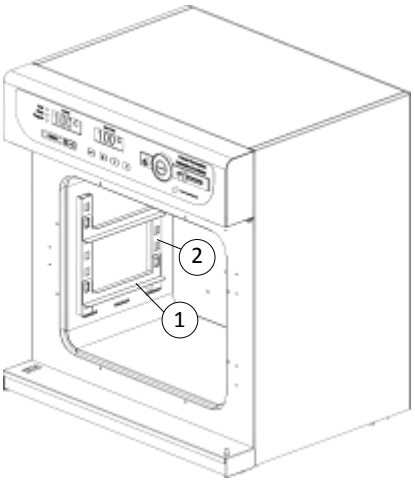
The equipment is designed to work with an electrical supply of 230V ± 10%, 50/60 Hz AC only. If the electrical supply is not within these parameters, then a suitable power transformer must be used, otherwise damage may be caused to the device or a hazardous situation may result.

It is recommended that the equipment has an unobstructed access to a dedicated power source.
This equipment can sustain a maximum of ±10% nominal voltage fluctuation; otherwise a power stabilizer is needed.

2.2 Installation

2.2.1 Shelf Installation

1. Put the shelf channel's hook into the holes in the pilasters (2).
2. Slide the shelf channel (1) down in place.
3. Do the same on the opposite side of the chamber.
4. Mount the shelf on top of the shelf channels.



2.2.2 Unit Installation

1. Move the equipment to its appropriate position and place it on top of the prepared support stand or cabinetry.
2. Wipe down the interior and exterior of the equipment with water or a mild household detergent.
3. Connect equipment to the main power supply.

2.3 Disclaimer

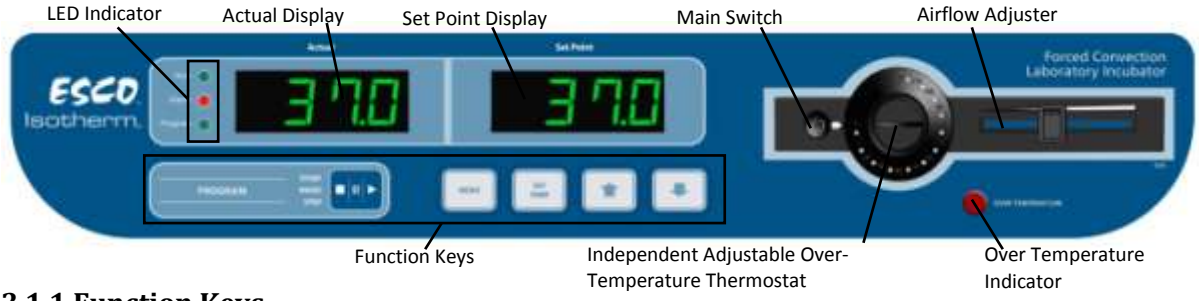
The performance and safety of the oven/incubator, while rigorously evaluated at the factory, cannot be guaranteed after transit and installation. Therefore the on-site testing is always recommended.

References for qualified Certifiers:

- Esco Distributor
- Esco (www.escoglobal.com)

Chapter 3 - Control System and Operation

3.1 Control System



3.1.1 Function Keys

MENU	MENU	Enters menu options. Switches between submenus.
SET TEMP	SET TEMP	Enters temperature and time setting option under basic operation mode. Enters submenu/save set parameters and withdraw submenu.
▲	UP	Parameter value plus key.
▼	DOWN	Parameter value minus key.
■ II ▶	PROGRAM	Program Operation Key: Stop/Pause/Start Multi-function key to access Program functions, including setting up program

3.1.2 LED Indicators

Heat	HEAT	Heating indicator
Alarm	ALARM	Alarm indicator
Program	PROGRAM	Program in work indicator

3.1.3 Independent Adjustable Over-Temperature Thermostat

Always set the adjustable temperature monitor to the proper temperature setting (it should be set to 20°C above the set value for oven and 10°C above the set value for the incubator.) The maximum value for the oven temperature monitor is 320°C, and the maximum value for the incubator temperature monitor is 120°C.

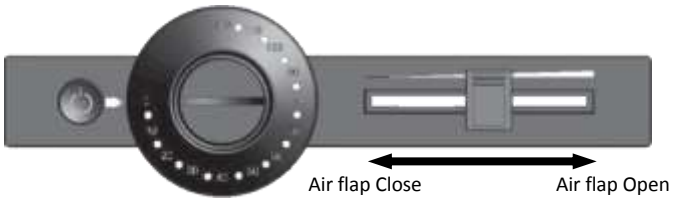
The device's temperature is monitored by an independent adjustable over-temperature thermostat Protection Class 3.1 to DIN 12880. If the set monitor temperature is exceeded, heating within equipment will be stopped. As a warning, the over temperature indicator light will illuminate. If this happens:

1. Switch off the equipment or even cut off the power supply and allow equipment to cool down
2. Contact customer service for assistance (and/or) rectify the fault
3. Restart the device only after the equipment is cooled down and fault has been rectified

3.1.4 Airflow Adjuster

The air flap's position may be adjusted via the slider at the front of the device. Opening or closing the flap regulates the rate of air exchange of the device.

Opening the exhaust vent will increase the fresh air exchange rate, and closing will achieve the opposite. This has minimal effect on temperature performance. The air exchange rate should be set in accordance to your application's requirements.



Note: *If the ventilation air flap is fully opened, the accuracy of the temperature within the unit will be affected. And the time to reach the temperature set point may take longer*

3.2 Placement of Loads

Full considerations must be given to physical and chemical properties of your load in order to prevent serious damage to load, equipment and surroundings.

Note:

a. *Forced Convection Laboratory Oven (OFA) / Forced Convection Laboratory Incubator (IFA) is not explosion-proof, thus it is NOT suitable for drying, evaporating and burning-in of paints, enamels or similar materials whose solvents may produce an inflammable mixture with air.*
b. *There must be no possibility of the formation of inflammable gas / air mixtures either within the equipment or in the immediate surroundings of the equipment.*
c. *Large amount of dust or corrosive fumes inside the equipment or in the surroundings of the equipment may produce deposits within the equipment and lead to short circuits or damage of electronics. Therefore it is important that adequate precautions are taken against excessive dust or corrosive fumes.*
d. *In order to ensure good ventilation within equipment, the total volume of loads should not exceed half volume of chamber (refer to "Technical Specification Summary Table"). Do not divide chamber into several separate parts by the loads with larger area.*
e. *There must be sufficient spacing of the load inside the equipment to ensure proper ventilation within the equipment. DO NOT place any load on the floor, against the side wall or underneath the ceiling of the equipment.*
f. *In order to ensure optimal ventilation, shelf should be inserted so that air spacing between shelves, door, load and inner chamber wall is approximately equal.*
g. *Maximum quantity and loading of shelves can be seen in "Technical Specification Summary Table". Improper loading and completely opened air flap in the exhaust vent may increase the time to reach the set temperature.*

3.3 Unit Operation

3.3.1 Switching ON/OFF

The equipment is switched ON by pressing the main switch downward; pressing the main switch upward will turn it OFF. The power supply will cut off and the operation will stop.

3.3.2 Opening/Closing Outer Door

Pull-down the handle to open the door, and pull-up to close the door.

NOTE: *As there are 2 knobs at the top and bottom of the outer door, the outer chamber may be damaged by the knobs if door handle is pulled-up during closing the door.*

3.3.3 Setting Temperature

• Range of temperature for Forced Convection Laboratory Oven (OFA) is +5°C above ambient up to 300°C.

• Range of temperature for Forced Convection Laboratory Incubator (IFA) is +5°C above ambient up to 100°C.

Note: *Equipment retains last temperature set point in the event of power failure, or if it is switched off.*

Step	Description	Button	Display
1	Press SET TEMP button to start the setting.	MENU	8888 8888
2	Press UP/DOWN button to set the temperature set point. Press SET TEMP to save setting	UP/DOWN – SET TEMP	

NOTE:

For Laboratory Ovens (OFA) High Temperature Application:

- *When operated above 250°C for the first time, interior stainless steel surfaces may turn pale yellow, and some light smoke may be emitted from the chamber for a few hours. This is due to the heat tinting of stainless steel, which is unavoidable at these high temperatures. Heat tinting only affects the appearance, but not the functional characteristics, of stainless steel.*
- *Before using the oven above 250°C for the first time, users are advised to operate the oven at 295°C for 2 hours in order to condition the chamber and to enable the heat tinting to run its course.*

3.4 Menu & Options

Basic setting	MENY ΣETT	Alarm setting	AΛPM	10
		Fan speed setting	ΦAN	100
		Timer setting	TIMP	OΦΦ
		Unit setting	YNIT	0X
		PIN setting	ΠIN	0
		Address setting	AΔΔP	0001
Program operation	MENY ΠPOΓ			
Calibration	MENY XAΛ			
System Parameter Display (Diagnostic Mode)	MENY AΔMN	Version number	E101	ς10
		AD sampling value	AΔX	100
		Present value	Πς	0
		Set value	Σς	0
		Upper limit alarm value	AΛPM	10
		Fan speed	ΦAN	100
		Upper limit of measuring range	YΠΛ	300
		Lower limit of measuring range	ΛYΛ	0
		Historic record of temperature	ΛOΓ0	0
			ΛOΓ9	0

3.4.1 Alarm Setting

The high point temperature alarm setting can be adjusted. Please note the alarm value is a relative setting.
Range for alarm setting: 10°C~50°C (for oven, maximum absolute value is 320°C; for incubator, 120°C).
In case, actual temperature in equipment is equal or higher than temperature set point + alarm value, heating will be switched off, buzzer will sound and red light of "Alarm" indicator will flash.

Press the UP button in normal operation to show alarm value.

Step	Description	Button	Display
1	Press MENU button until the display shows Setting. Press SET TEMP to enter the menu.	MENU – SET TEMP	MENY ΣETT
2	Press MENU button until the display shows Alarm.	MENU	ΑΛΡΜ 10
3	Press UP/DOWN button to choose the alarm value. Press SET TEMP to save setting.	UP/DOWN – SET TEMP	

3.4.2 Fan Speed Setting

To set the fan speed. Lower fan speed, will increase the temperature variation in the equipment. For ovens, lower fan speed may be used for applications involving powders (which may otherwise be dispersed within the chamber at the high fan speed - recommended below 50). For incubators, lower fan speed may be preferred in some applications to minimize disturbance to the items being cultured.

In general, we recommend fan speed is operated as high as the application dictates, in order to achieve the best temperature variation performance. Range of fan speed is between 0 and 100 and the optimum fan speed is between 50 and 100.

Step	Description	Button	Display
1	Press MENU button until the display shows Setting. Press SET TEMP to enter the menu.	MENU – SET TEMP	MENY ΣETT
2	Press MENU button until the display shows Fan.	MENU	ΦAN 100
3	Press UP/DOWN button to choose the fan speed value. Press SET TEMP to save setting.	UP/DOWN – SET TEMP	

3.4.3 Timer Setting

3.4.1.1 Turning the timer ON and OFF

Step	Description	Button	Display
1	Press MENU button until the display shows Setting. Press SET TEMP to enter the menu.	MENU – SET TEMP	MENY ΣETT
2	Press MENU button until the display shows Timer.	MENU	TIMP OΦΦ
3	Press UP/DOWN button to set the timer ON/OFF. Press SET TEMP to save setting.	UP/DOWN – SET TEMP	

3.4.1.2 Set timer (0000 – 9999 seconds)

Time is set in normal operation, not in main menu. So exit the menu to set timer.

Step	Description	Button	Display
1	Press DOWN to enter TIMER function	DOWN	TIMP 0000
2	Press SET TEMP button to start the setting.	SET TEMP	8888 8888
3	Press MENU button until the display shows Timer.	MENU	TIMP 0000
4	Press UP/DOWN button to set required time. Press SET TEMP to save setting.	UP/DOWN – SET TEMP	

NOTE:

- *The timer starts when the actual temperature is equal/larger than the set point temperature. Do not turn off the timer, once it starts.*
- Ενδ *is shown on "Actual" display and buzzer sounds 5 times as counting ends.*
- *Timer will not be saved and assumed to be* 0000 *as equipment is re-started.*

3.4.4 Unit Setting

Step	Description	Button	Display
1	Press MENU button until the display shows Setting. Press SET TEMP to enter the menu.	MENU – SET TEMP	MENY ΣETT
2	Press MENU button until the display shows Unit.	MENU	YNIT °X
3	Press UP/DOWN button to choose the unit (Celsius or Fahrenheit). Press SET TEMP to save setting.	UP/DOWN – SET TEMP	

3.4.5 Password (PIN) Setting

The PIN consists of 4 alphanumeric digits. When set to 0000, the PIN is disabled; otherwise the MENU and SET TEMP buttons functions require PIN.

3.4.5.1 Set PIN (0000 – 9999; 0000 – pin disabled)

Step	Description	Button	Display
1	Press MENU button until the display shows Setting. Press SET TEMP to enter the menu.	MENU – SET TEMP	MENY ΣETT
2	Press MENU button until the display shows PIN.	MENU	ΠIN 0
3	Press UP/DOWN button to set the PIN's digit. Press SET TEMP to confirm the number and move to the next digit.	UP/DOWN – SET TEMP	
4	Repeat step 3 until the fourth digit. Once the fourth digit is chosen, pressing SET TEMP button will save the PIN.		

3.4.5.2 Enter PIN

Step	Description	Button	Display
1	Press MENU or SET TEMP button to enter PIN.	MENU/SET TEMP	ΠIN 0
2	Press UP/DOWN button to set the PIN's digit. Press SET TEMP to confirm the number and move to the next digit.	UP/DOWN – SET TEMP	
3	Repeat step 2 until the fourth digit.		

Note: *In case PIN is lost, please contact Esco after-sales service for help.*

3.4.6 Address Setting (1 – 32)

Step	Description	Button	Display
1	Press MENU button until the display shows Setting. Press SET TEMP to enter the menu.	MENU – SET TEMP	MENY ΣETT
2	Press MENU button until the display shows Address.	MENU	AΔΔP 0001
3	Press UP/DOWN button to choose the address. Press SET TEMP to save setting.	UP/DOWN – SET TEMP	

3.5 Program

3.5.1 Setting Program

Activating program mode:

Step	Description	Button	Display
1	Press MENU button until the display shows Program. Press SET TEMP to enter the menu.	MENU – SET TEMP	MENY ΠPOΓ
2	Press UP/DOWN button to set the program ON/OFF. Press SET TEMP to save setting.	UP/DOWN – SET TEMP	

There are 1~10 main programs. 5 segments are available in each main program.
The following steps are only accessible when the program mode is activated.

	"Actual" Display	"Set Point" Display	Note
Press PROGRAM	ΠΡΟΓ	0001	Press / to select the number of the program. Then press to confirm the number of the program.
Press MENU	X–01	0000	Press UP/DOWN to select the required temperature set point.
Press MENU	T–01	0000	Press UP/DOWN to select the required period of time.
Press MENU	X–02	0000	Press UP/DOWN to select the required temperature set point.
Press MENU	T–02	0000	Press UP/DOWN to select the required period of time.
Press MENU	X–03	0000	Press UP/DOWN to select the required temperature set point.
Press MENU	T–03	0000	Press UP/DOWN to select the required period of time.
Press MENU	X–04	0000	Press UP/DOWN to select the required temperature set point.
Press MENU	T–04	0000	Press UP/DOWN to select the required period of time.
Press MENU	X–05	0000	Press UP/DOWN to select the required temperature set point.
Press MENU	T–05	0000	Press UP/DOWN to select the required period of time.
Press MENU	Confirming acceptance of the setting and both displays go back to normal		

Note: *Press SET TEMP anytime to save and exit settings*

3.5.2 Program Operation

Action	"Actual" Display	"Set Point" Display	Note
To select and activate program :			
Press PROGRAM	ΠΡΟΓ	Program number	Press / to change program number and press to confirm
Press PROGRAM for 5 seconds.	ΠΡΟΓ	Selected Program number	Buzzer sounds once and green light "Program" indicator is flashing to show that the program is activated. Time counting starts.
During program operation :			
Press PROGRAM	Actual temperature in equipment	HOΛΔ and temperature set point flashing correspondingly.	Green light "Program" indicator is on to show that the program is paused.
Press PROGRAM again.	Actual temperature in equipment	Temperature set point.	Green light "Program" indicator is flashing to show that the program is re-started.
Press PROGRAM for 5 seconds.	Actual temperature in equipment	0.0	Buzzer sounds twice and green light "Program" indicator is off to show that the program is stopped.
At the end of program operation :			
If time is set to be 0	Actual temp in equipment	HOΛΔ	Grenn light "Program" indicator is on and buzzer sounds. Output is cut-off and all keys are locked except PROGRAM
If time is set to negative value	Actual temp in equipment	ENΔ	Green light "Program" indicator is flashing to show that the program is re-started.
Press PROGRAM for 5 seconds.	Actual temp in equipment	0.0	Buzzer sounds twice and green light "Program" indicator is off to show that the program is stopped. Equipment is re-started and all keys are activated.

Note:

- *PROG value cannot be changed during program operation or timing operation.*
- *If program operation is not selected, temperature set point will default to C-01 of program 1*

3.5.3 Setting Temperature and Time in Program Mode

"Actual" display	"Set Point" display
X–01	Temperature corresponding to the first segment
T–01	Time corresponding to the first segment
…	…
X–05	Temperature corresponding to the fifth segment
T–05	Time corresponding to the fifth segment

Note:

- *Range of C-xx: full measuring range.*
- *Range of T-01: 0 - 9999*
- *Range of T-02 - 05: -11 - 9999*
- *If T-02 - 05 is set to be 0; program operation stops but temperature control is kept on.*
- *If T-02 - 05 is set to be -11; program operation stops and temperature control stops therefore inner chamber cools down naturally afterward.*
- *If T-02 - 05 is set to be -1 - -10; program will jump to the program number with the same absolute value i.e. if set to -1, the program will just to jump the 1st segment of the 1st program.*

Setting the time with a negative number will allow for different combination of programs.

Here are some examples for reference:

Example 1

Present PROG=1, T-05 is set to be -2
Indicate that it will jump to PROG=2 at the end of present program segment

Example 2

C-01=100 T-01=10
C-02=120 T-02=20
C-03=120 T-03=-11
100°C temperature control for ten minutes starting from the first segment. Then 120°C temperature control for twenty minutes in the second segment before the operation is stopped.

Example 3

PROG=1 (repeat a program)
C-01=100 T-01=10
C-02=120 T-02=20
C-03=120 T-03=20
C-04=100 T-04=10
C-05=100 T-05=-1
If the negative number set for T-05 is the same as the number of PROG segment ' it indicates that the operation of the program segment is repeated.

Example 4

If T-05 in PROG segment is non-negative number, operation stops as T-05 of a segment is completed.

PROG=1		*PROG=2*	
C-01=100	*T-01=10*	*C-01=100*	*T-01=10*
C-02=120	*T-02=20*	*C-02=120*	*T-02=20*
C-03=120	*T-03=20*	*C-03=120*	*T-03=0*
C-04=100	*T-04=10*	*C-04=100*	*T-04=0*
C-05=120	*T-05=10*	*C-05=100*	*T-05=0*

Thus, program enables independent operation of the corresponding PROG segment according to PROG's setting.

Example 5

If, for the first segment of program, C-01=x (temperature value within measuring range) T-01=0, execution of program will not be enabled.

Example 6

Looping between multiple programs with auto-repeat

PROG=9		*PROG=10*	
C-01=100	*T-01=10*	*C-01=200*	*T-01=10*
C-02=120	*T-02=-10*	*C-02=120*	*T-02=-9*

Looping between these 2 programs is allowed.

Example 7

C-01=100 T-01=10
C-02=200 T-02=0
C-03=220 T-03=10
Program executes C-01 for 10 minutes, jump and stay in C-02 until PROGRAM button is pressed, then program will run C-03 for 10 minutes.

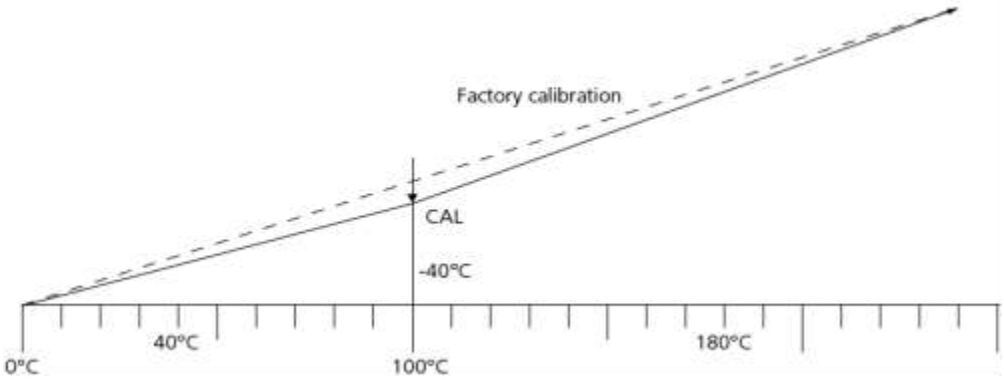
Example 8

C-01=100 T-01=10
C-02=250 T-02=0
C-03=200 T-03=10
Program will execute C-01 for 10 minutes, then go to C-03 for 10 minutes without executing C-02.

3.6 Calibration (Offset Range: -20°C – 20°C)

General calibration instructions:
For example: set the calibration offset for correction of a temperature deviation in the load at 100°C
Equipment set point = 100°C, equipment actual display = 100°C, actual temperature tested= 99.6°C (put the sensor of a calibrated reference instrument near to the temperature probe of the product).

- Enter the Menu and find CAL (calibration) according to the steps above.
- The default value is 0.0
- Set calibration correction according to above steps in the table --- CAL= -0.4°C
- Exit the menu, then the actual display will be 99.6°C.
- Equipment will run automatically to 100°C to achieve the set point.
- Minimum calibration value is 0.1°C.



Note: *if no calibration is set, 0000 is restored as factory calibration shown on "Set Point" display.*

Chapter 4 - General Maintenance

4.1 Scheduled Maintenance

Proper and timely maintenance is crucial for trouble free functioning of any device and your Esco unit is no exception to this rule. We strongly recommend that you follow the maintenance schedule suggested here under in order to obtain optimal performance from your unit.

No	Description of task to perform	Maintenance to be carried out every			
		Day	Month	Quarter	Year
1	Decontaminate the work zone	✓			
2	Clean the exterior and interior surfaces, screen frame and temperature probe		✓		
3	Inspect the equipment for any physical abnormalities or malfunction			✓	
4	Clean up stainless steel surfaces with MEK			✓	
5	Lubricate door's moving parts				✓
6	Check tightness of hinge screws on door's moving parts				✓
7	Readjustment of door				✓

4.2 Cleaning

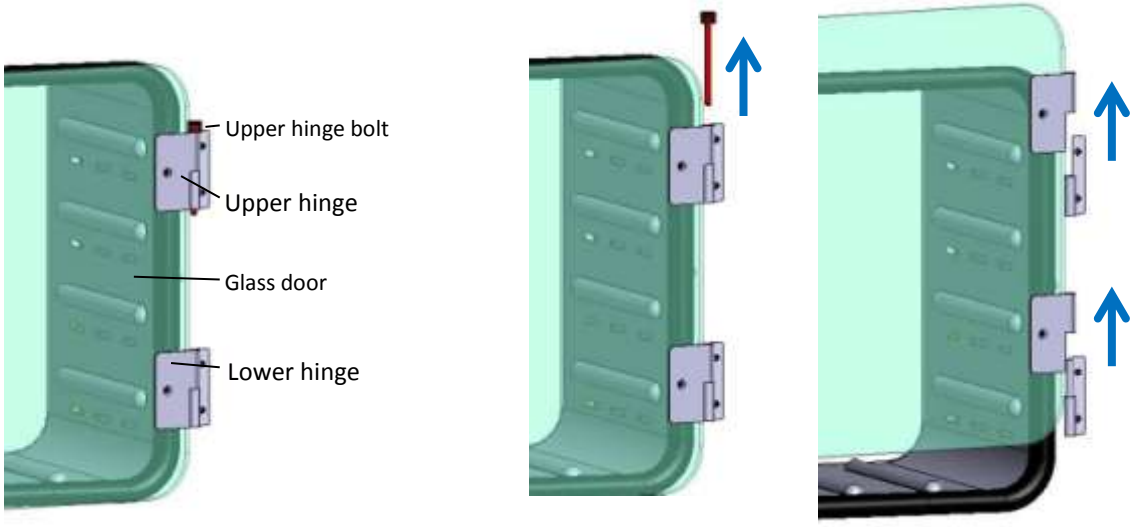
- Cut off power supply before cleaning.
- Clean and wipe exterior and interior surfaces using a wet and soft cloth.
- Don't clean the equipment with water.

4.2.1 The Glass Door

Glass door is designed to allow the user to observe loads in the equipment during operation, without opening of the door and causing temperature inaccuracy. Regular cleaning of glass door is recommended.

To clean the glass door:

1. Rotate the glass door handle less than 90°
2. Remove upper hinge bolt and remove glass door upward
3. Clean the glass door using non-corrosive (chlorine and hydrochloric acid-free) water, alcohol or surface detergent.Neutral detergent is recommended.
4. Reverse the above steps to re-assemble the glass door.



4.2.2 Control Panel, Exterior & Interior Surfaces, Screen Frame, Temperature Probe

Clean the control panel using non-corrosive (chlorine and hydrochloric acid-free) water and surface detergent. Neutral detergent is recommended.

For removing stubborn stains or spots on the stainless steel surfaces, make use of MEK (Methyl-Ethyl-Ketone). In such cases, make sure that you wash the steel surface immediately afterwards with clean water and some liquid detergent. Use a polyurethane cloth or sponge for washing. Regularly cleaning the stainless steel surface can help you retain the attractive factory finish.

Note:

- *In order to achieve optimal maintenance, clean thoroughly and regularly. After cleaning, the residual detergent can be removed by slightly wet soft cloth.*
- *Do not clean the control panel using acidic detergent or chlorine-containing compounds.*

4.2.3 Decontaminate the Work Zone

Thoroughly wipe the work surface, side walls, inner back walls and all other surfaces in the interior of the equipment using a disinfectant appropriate for the work being conducted in your lab.

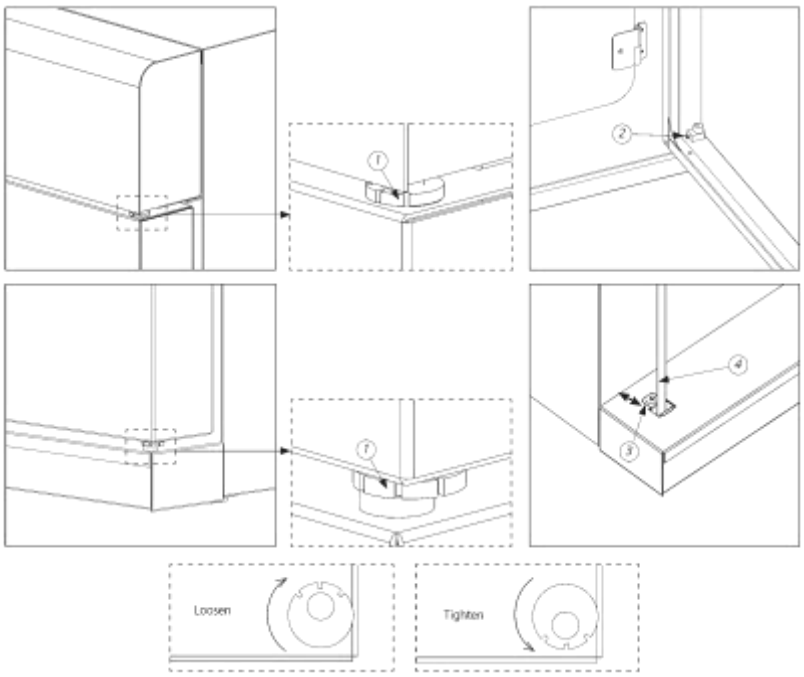
4.3 Physical Inspection

- Check the equipment to ensure that it is functioning properly and replace parts if necessary.
- Lubricate the door's moving parts annually to ensure that the parts are moving smoothly.
- Check the tightness of door's screws on moving parts annually. Ensure that the hinge screws are tight.

4.3.1 Readjustment of door

A well-closing door is essential. On Esco Forced Convection Laboratory Oven and Incubator, tight closure of the door is ensured by silicone gasket on the chamber and door. Continuous operation reduces flexibility of the seal. Therefore, readjustment may be necessary in order to ensure proper closing of the door:

a) Release screw (2) by screwdriver and rotating the part (1) by means of hexagon socket key. Apply more locking varnish to part (1) and tighten it.
b) Adjust rod catch (3) in the direction of the arrow after releasing door rod (4). Screw down the panel firmly after adjustment.



Note:

- *It must be conducted by qualified electrician or technician authorized by Esco.*
- *It is recommended that the maintenance is done annually.*
- *Cut off power supply before doing maintenance works.*

4.4 Removal of deposits

Deposits can be removed by three ways, depending on the composition of loads and contacted materials.

- Automatic high temperature decontamination

Note: *Take out all combustible materials and set overheat protector to maximum value beforehand.*

- Spray standard acid-free disinfectant

Note: *Before startup, thoroughly wipe the unit with dry cloth as explosive gases may be generated during pollutant removal.*

- Indoor parts can be decontaminated by high-pressure decontamination.

Note: *Safety measures need to be implemented to ensure the safety during deposits removal.*

4.5 Maintenance/Service Log

It is good practice (and in some cases regulatory requirement) to maintain a log of all maintenance work carried out on your freezer.

Chapter 5 - Troubleshooting

Under no circumstances should the unit be disassembled, repaired, or converted by unqualified people. Failure to follow these instructions may cause personnel injury and/or loss of property due to malfunctions, electric shocks or fire.

Should the unit malfunction, stop the operation, and then pull out the power plug or turn off the power supply at source. Continuing to operate the unit when it shows signs of malfunctioning may cause irreparable damage to the unit and/or its components.

The following troubleshooting are some of the basic problems that can be solved by the user or operator. However if the problem persist, please contact your local distributor.

Problem 1: Unit doesn't start

Possible Cause	Corrective Action
Power failure	• Check whether there is power on the cord set
Flat cable connection is lose	• Strengthen the flat cable connection between controller board and power board
Fuse is blown	• Replace with new fuse (spare part needed)

Problem 2: Fan is not running

Possible Cause	Corrective Action
Fan speed is zero	• Set fan speed to desired speed
Fan motor is spoiled	• Change with new Fan motor (spare part needed)

Problem 3: Unit cannot heat up

Possible Cause	Corrective Action
Heater is spoiled	• Change with new heater (spare part needed)
Controller board & power board is spoiled	• Change controller board and power board (spare part needed)

Problem 4: Unit takes very long to heat up

Possible Cause	Corrective Action
Insulation wrap is torn	• Contact service technician to wrap new insulation
Controller board & power board is spoiled	• Change controller board and power board (spare part needed)

Problem 5: Independent over temperature protection cannot work

Possible Cause	Corrective Action
Thermostat is spoiled	• Change with new thermostat (spare part needed)

APPENDIX

LOG RECORD

Unit : _____
Serial Number : _____
Person in Charge : _____

1. This log record should be used by the operator to record any new agent that has been introduced to the unit during its operation, problems encountered, etc.
2. Please also record any major maintenance procedure performed by the service technician, for example: parts replacement, recertification, etc.

Date	Event	User Signature	Supervisor Signature

In case of emergencies, please call:
Name : _____
Cell Phone Number : _____
E-mail : _____